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Kind regards,

Team Nexperia



IP4221CZ6-XS

ESD protection for high-speed interfaces

Rev. 2 — 13 December 2012

Product data sheet

1. Product profile

1.1 General description

The device is designed to protect high-speed interfaces such as USB 2.0, Ethernet and Digital Visual Interface (DVI) against ElectroStatic Discharge (ESD).

The device includes four high-level ESD protection diode structures for high-speed signal lines and is encapsulated in a leadless ultra small DFN1010-6 (SOT891) plastic package.

Special diode configuration protects all signal lines and offers ultra low line capacitance of only 1 pF. The rail-to-rail diodes are connected to the Zener diode which allows ESD protection to be independent of supply voltage.

1.2 Features and benefits

- System ESD protection for high-speed data lines such as USB 2.0, Ethernet and DVI
- All signal lines with integrated rail-to-rail clamping diodes for downstream ESD protection of ± 8 kV according to IEC 61000-4-2, level 4
- Line capacitance of only 1 pF for each channel
- Leadless ultra small DFN1010-6 package: $1 \times 1 \times 0.5$ mm; pitch 0.5 mm

1.3 Applications

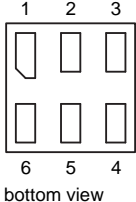
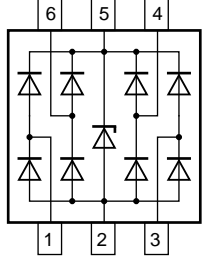
The device is designed for high-speed receiver and transmitter port protection:

- Mobile phones, smartphones and handsets
- TVs and monitors
- DVD recorders and players
- Notebooks, mother boards, graphic cards and ports
- Set-top boxes and game consoles



2. Pinning information

Table 1. Pinning

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|-----------------|----------------|---|---|
| 1 | I/O 1 | ESD protection |  |  |
| 2 | GND | ground | | |
| 3 | I/O 2 | ESD protection | | |
| 4 | I/O 3 | ESD protection | | |
| 5 | V _{CC} | supply voltage | | |
| 6 | I/O 4 | ESD protection | | |

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3. Ordering information

Table 2. Ordering information

| Type number | Package | | |
|--------------|-----------|--|---------|
| | Name | Description | Version |
| IP4221CZ6-XS | DFN1010-6 | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1 × 0.5 mm | SOT891 |

4. Marking

Table 3. Marking codes

| Type number | Marking code |
|--------------|--------------|
| IP4221CZ6-XS | 1X |

5. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | Min | Max | Unit |
|------------------|---------------------------------|---|------|------|------|
| V _I | input voltage | | -0.5 | +5.5 | V |
| V _{ESD} | electrostatic discharge voltage | IEC 61000-4-2, level 4; [1] contact discharge | -8 | +8 | kV |
| T _{stg} | storage temperature | | -55 | +125 | °C |
| T _{amb} | ambient temperature | | -40 | +85 | °C |

[1] All pins to ground.

6. Characteristics

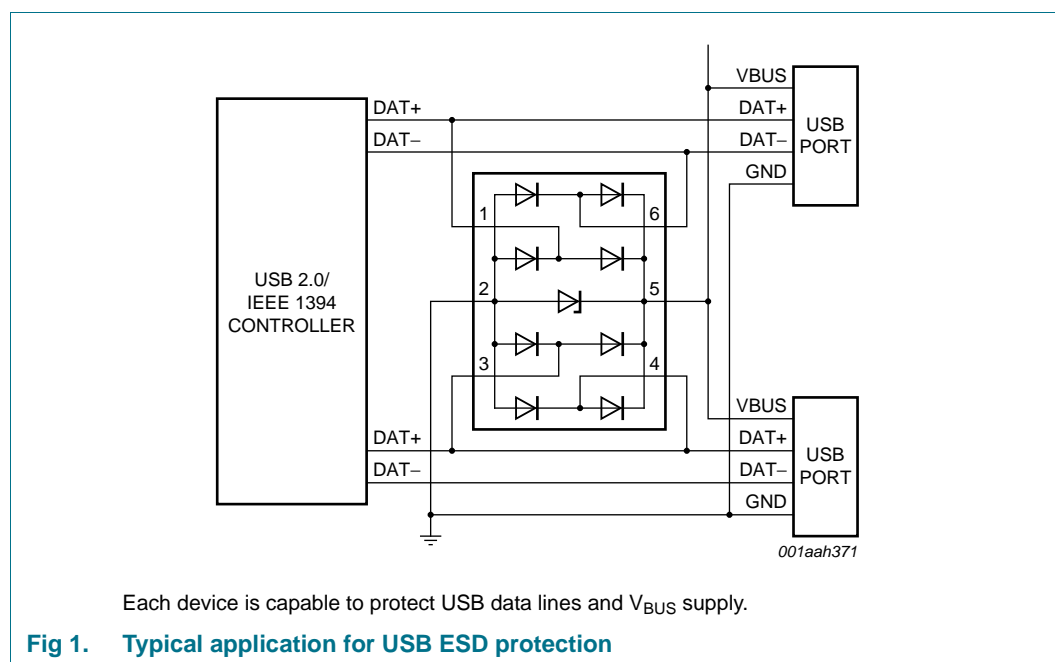
Table 5. Characteristics
T_{amb} = 25 °C unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------------|------------------------------------|---|--------|-----|-----|--------|
| C _(I/O-GND) | input/output to ground capacitance | V _I = 0 V; f = 1 MHz; V _{CC} = 3 V | [1][2] | - | 1 | 1.2 pF |
| I _{RM} | reverse leakage current | V _I = 3 V | [3][2] | - | - | 100 nA |
| V _{BRzd} | Zener diode breakdown voltage | I _I = 1 mA | [4] | 6 | - | 9 V |
| V _F | forward voltage | I _{test} = 10 mA | - | 0.7 | - | V |

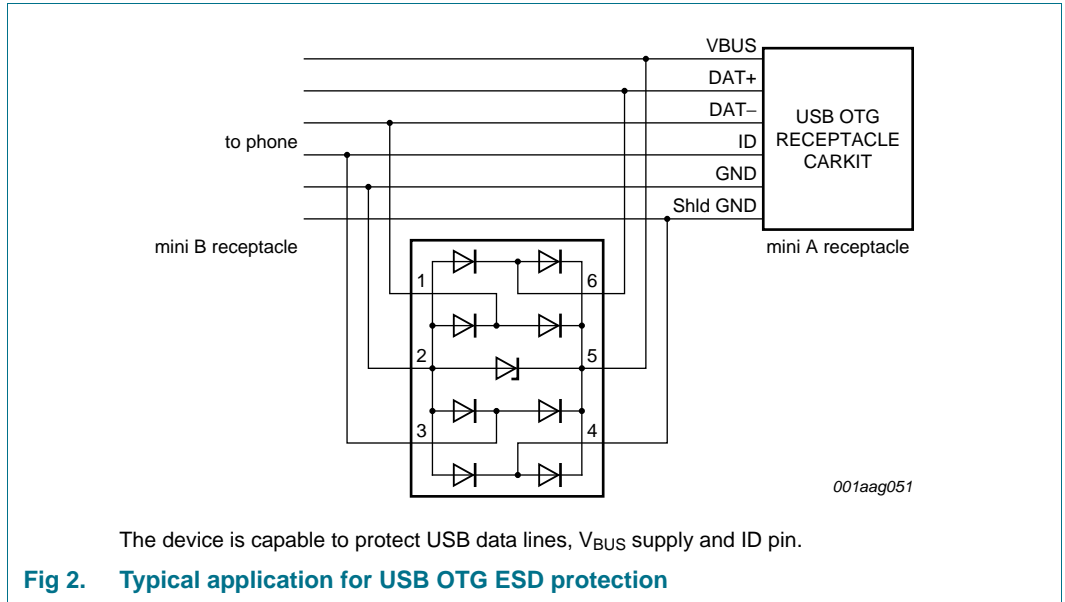
- [1] This parameter is guaranteed by design.
- [2] Pins 1, 3, 4 and 6 are measured to ground.
- [3] All pins measured to ground (pin 2).
- [4] Measured from pin 5 to pin 2.

7. Application information

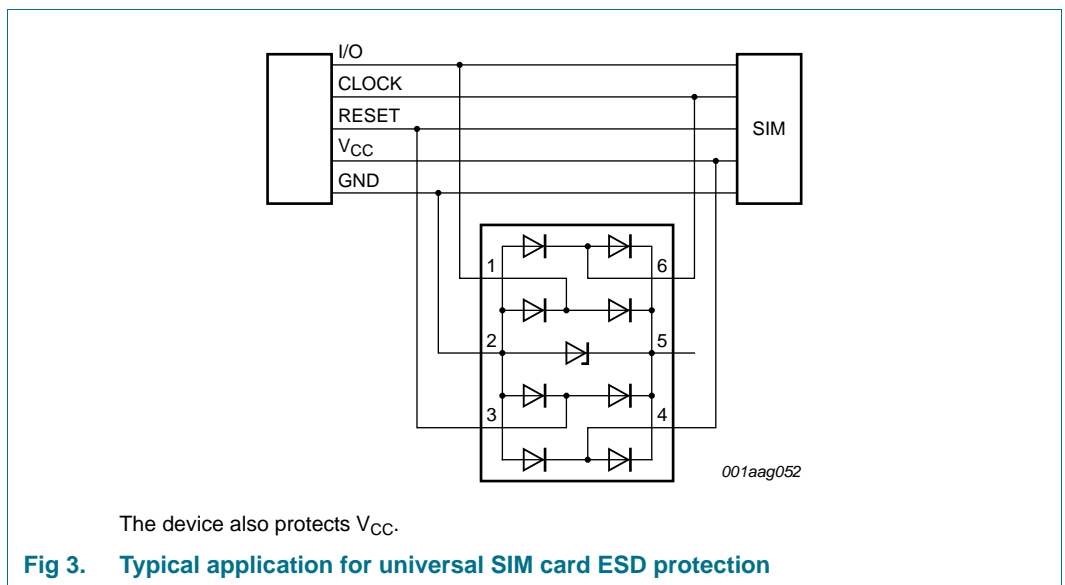
7.1 USB 1.1 and 2.0 protection



7.2 USB On-The-GO (OTG) protection



7.3 Universal SIM card protection



7.4 IEEE 1394a/b protection

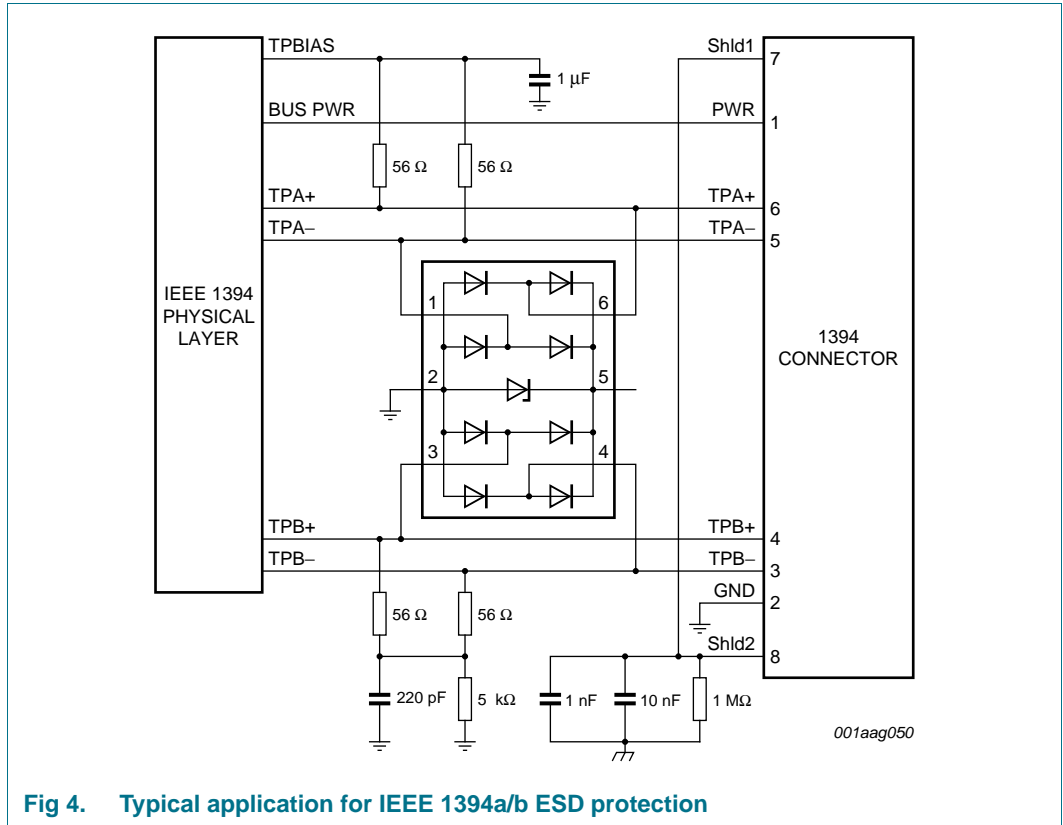


Fig 4. Typical application for IEEE 1394a/b ESD protection

7.5 Gigabit Ethernet transceiver protection

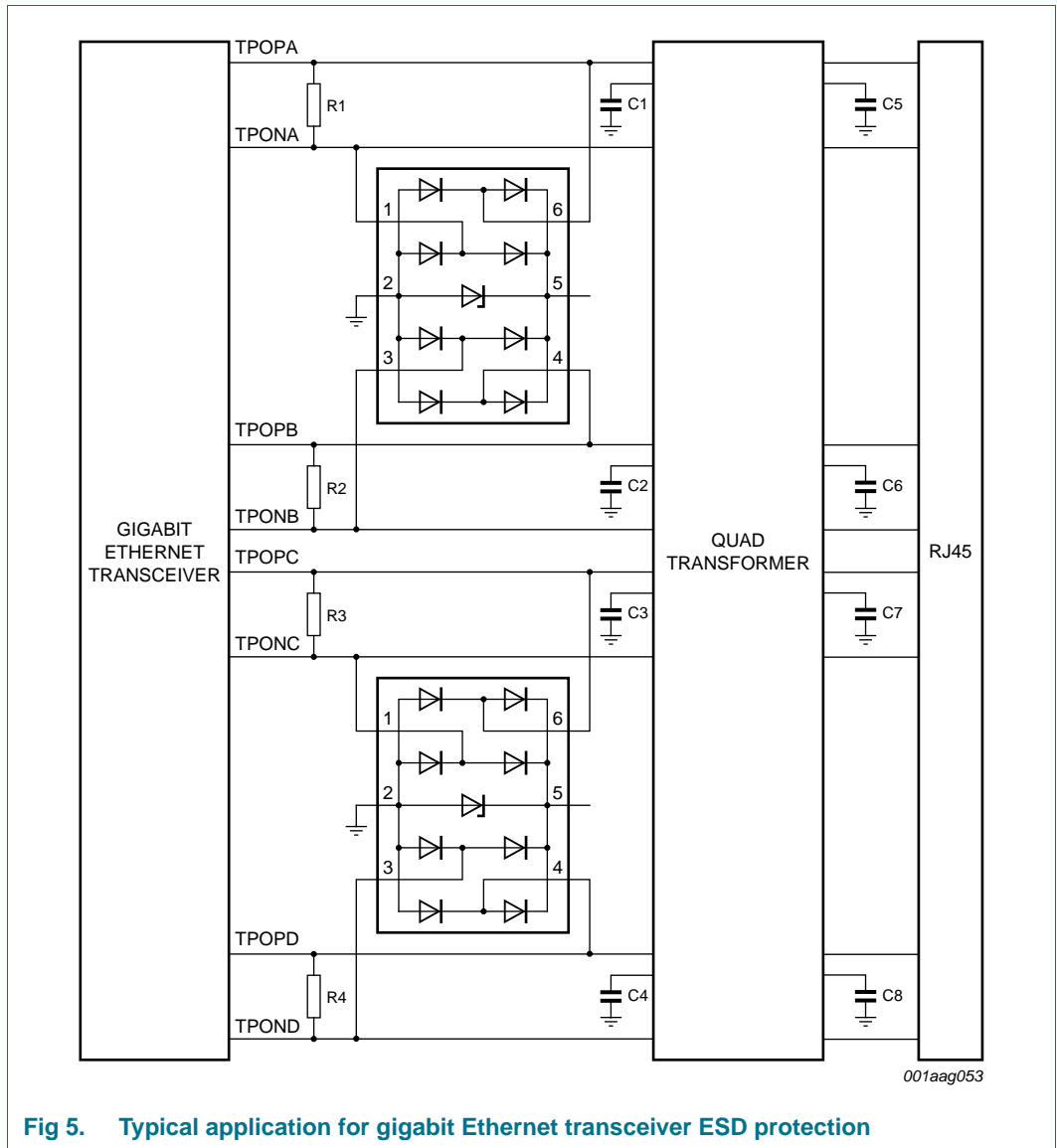


Fig 5. Typical application for gigabit Ethernet transceiver ESD protection

7.6 Universal microSD/TransFlash and SD memory card protection

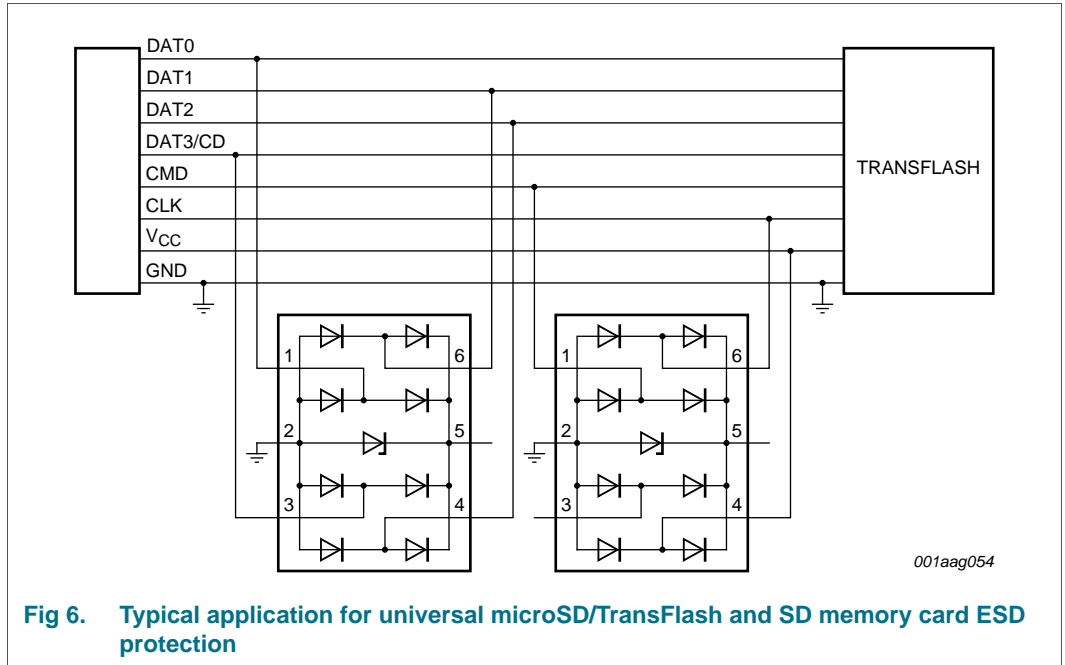


Fig 6. Typical application for universal microSD/TransFlash and SD memory card ESD protection

8. Package outline

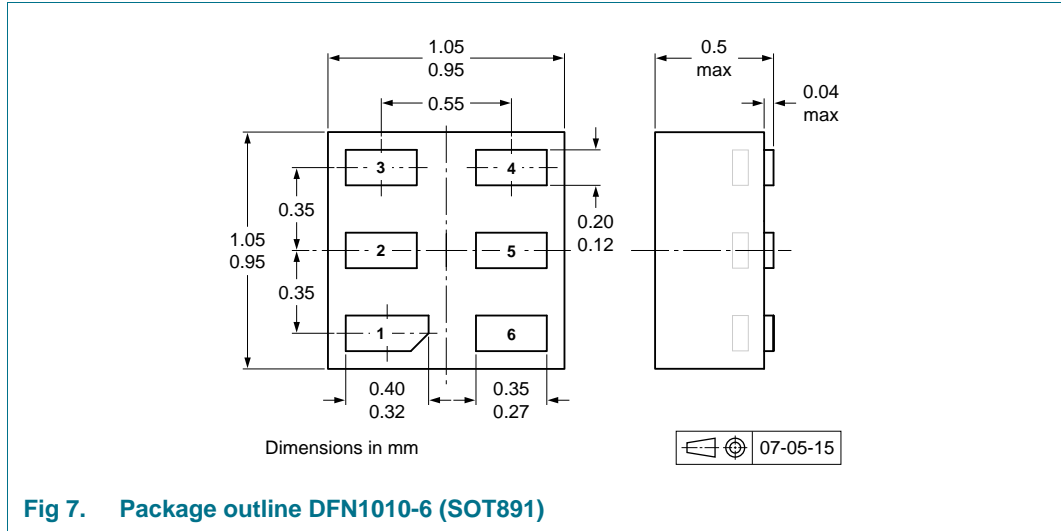


Fig 7. Package outline DFN1010-6 (SOT891)

9. Packing information

Table 6. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code. [1]

| Type number | Package | Description | Packing quantity |
|--------------|--------------------|------------------------------------|------------------|
| | | | 5000 |
| IP4221CZ6-XS | DFN1010-6 (SOT891) | 4 mm pitch, 8 mm tape and reel; T4 | [2] -132 |

[1] For further information and the availability of packing methods, see Section 13.

[2] T4: reverse taping

10. Soldering

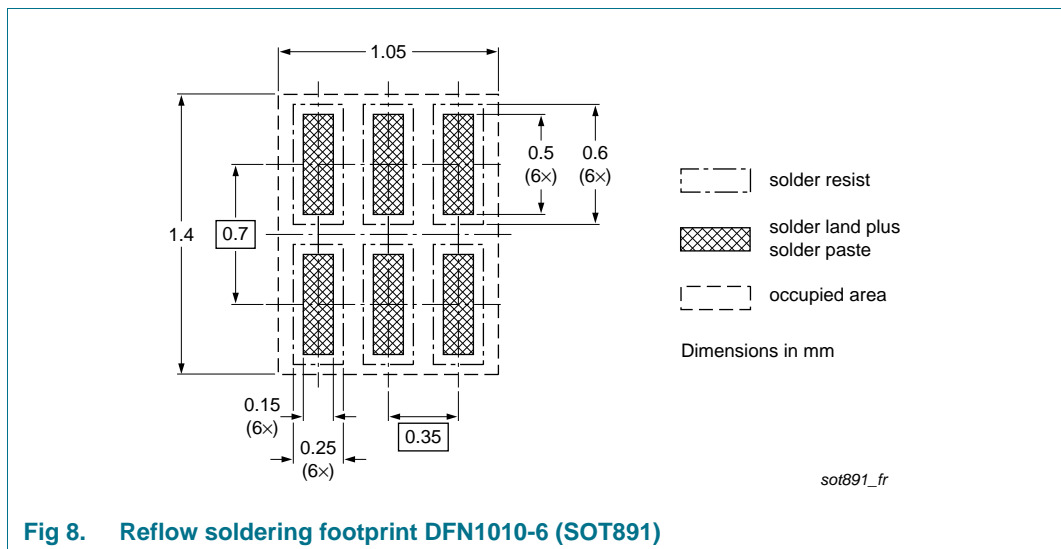


Fig 8. Reflow soldering footprint DFN1010-6 (SOT891)

11. Revision history

Table 7. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|------------------|---|----------------------|---------------|------------------|
| IP4221CZ6-XS v.2 | 20121213 | Product data sheet | - | IP4221CZ6-XS v.1 |
| Modifications: | <ul style="list-style-type: none"> • Section 1 "Product profile": updated • Section 4 "Marking": added • Section 5 "Limiting values": T_{amb} added • Recommended operating conditions: removed • Table 5 "Characteristics": updated • Section 7 "Application information": updated • Section 8 "Package outline": drawing replaced with minimized package outline drawing • Section 10 "Soldering": added • Section 12 "Legal information": updated | | | |
| IP4221CZ6-XS v.1 | 20070611 | Objective data sheet | - | - |

12. Legal information

12.1 Data sheet status

| Document status ^{[1][2]} | Product status ^[3] | Definition |
|-----------------------------------|-------------------------------|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet | Qualification | This document contains data from the preliminary specification. |
| Product [short] data sheet | Production | This document contains the product specification. |

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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